Claim 1 is rejected based on Hayase.

Claim 1 requires an amplitude detecting means for detecting an amplitude value of a diaphragm of the speaker to produce an amplitude signal corresponding to the amplitude value. To the contrary, Hayase discloses a vibration detecting coil 4 (FIG. 1) and a magnetic circuit constituting member, which are not part of the speaker, that serve as the vibration detecting means. Col. 4, lines 1-6. The Examiner asserts that it is inherently evident that the detecting means detects motion characteristics from the speaker unit structure as well as the radiator, but Applicants disagree.

Hayase states that "the vibration detecting coil 4 generates a detecting current according to vibrations of the passive radiator 3." Col. 4, lines 2-4. Thus, Hayase clearly discloses a way of detecting vibrations that does not explicitly include detecting an amplitude of a diaphragm of a speaker. Furthermore, Applicants submit that it is not necessarily the case that Hayase's vibration detecting coil detects an amplitude of a diaphragm of a speaker, as well as detecting the vibrations of the passive radiator 3.

In Hayase, a speaker system using a passive radiator or bass reflex duct is proposed. The system using the passive radiator (Hayase Fig. 1) is discussed below. However, the same behavior is obtained in the system using the bass reflex duct.

The system using the passive radiator expands the low frequency range using the resonance between a cabinet and the passive radiator. Appendix 2 in 2-A shows the reproduced sound pressure of the speaker unit (referred to as "driver") and the passive radiator. Appendix 2 in 2-B shows the amplitude characteristic of the driver and the passive radiator.

Hayase discloses the configuration of positively feeding back the vibration of the passive radiator. Appendix 2 in 2-B shows that the amplitude characteristics of the driver and the passive radiator are entirely different. In the vicinity of the frequency where the amplitude of the passive radiator is maximum (maximum in the degree of feedback), the amplitude of the driver is restrained. Explanation of the operation using an equivalent circuit is provided in the Additional Appendix. Although the passive radiator is indirectly driven by the driver, the fed-back signal does not reflect the amplitude characteristic of the driver. Thus, it is apparent that Hayase cannot each the operation of detecting the amplitude characteristic of the diaphragm of the speaker.

Therefore, Applicants submit that claim 1 is allowable over Hayase.

Claims 1, 8, 11, 13, and 15 are rejected based on Noro.

Noro is an invention for improving the negative impedance driving circuit (current positive feedback circuit) shown in Fig. 2. The circuit configuration intends to perform ideal impedance driving (current positive feedback driving). Appendix 3 shows the characteristic of the negative impedance driving (current positive feedback driving).

Noro discloses the means for correcting the impedance in the negative impedance driving, as discussed in the Response filed August 29, 2002. The basic idea of Noro resides in the negative impedance circuit shown in Fig. 2. In this circuit, the signal proportional to the current flowing through the load (speaker) is positively fed back to the driving circuit. As a result, the resonance can be damped, while obtaining the driving force.

Noro proposed the feedback circuit shown Fig. 1 in order to improve the stability of the basic circuit of Fig. 2. The feedback circuit shown in Fig. 1 is further provided with equivalent impedance means 4, comparison means 5, and feedback gain control means 6.

The feedback loop itself in Fig. 1 is implemented in a manner that the feedback gain control means 6 is inserted in the feedback loop of Fig. 2. The feedback gain control means 6 is a means for controlling the feedback gain (Noro, column 3, line 41-51). Therefore, the idea of "current positive feedback" represented in Fig. 2 is not altered. This idea is fundamentally different from the idea (amplitude positive feedback) adopted in the present invention.

Appendix 1 in 1-A shows the operation characteristics of an ordinary speaker, inclusive of "frequency vs. sound pressure level" and "frequency vs. impedance". The operation characteristics are also shown for "frequency vs. current" and "frequency vs. amplitude". Appendix 1 in 1-A shows the speaker sound pressure characteristics after the amplitude has been positively fed back. When the amplitude of the diaphragm has been positively fed back, the degree of feedback becomes maximum in the frequency below f0 so that the reproduction limit in the lower frequency range is extended.

Applicants submit that there is no suggestion or motivation for those skilled in the art to modify the configuration of Noro into that of the amplitude positive feedback. Appendix 3 explains the operation of the current positive feedback driving. As seen from the graph, in the current positive feedback driving, the degree of feedback is minimum at fo. On the other hand, as described above, in the amplitude positive feedback driving, the degree of feedback is maximum at the frequency below fo and minimum at a high frequency. Therefore, to modify the

configuration of Noro by the amplitude positive feedback will fundamentally change the operation intended by Noro.

Furthermore, Applicants submit that there is no suggestion or motivation to modify Noro in the manner suggested by the Examiner. To establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant. *In re Kotzab*, 55 USPQ2d at 1316 (*citing In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); and *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)). Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference. *In re Kotzab*, 55 USPQ2d at 1316-1317 (*citing B.F. Goodrich Co. v. Aircraft Breaking Sys. Corp.*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996)); *see also* MPEP § 2142 (*quoting Ex parte Clapp*, 227 USPQ 972, 973 (B. Pat. App. & Inter. 1985)) ("To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.").

Here, the Examiner admits that Noro fails to disclose a detecting means for detecting an amplitude value of a diaphragm of a speaker, but does not provide a convincing line of reasoning as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the reference. Instead, the Examiner merely asserts that because such a detecting means was well known in the art, modifying Noro to include the

Applicants' claimed detecting means would have been obvious. The Examiner's alleged motivation to modify Noro appears to be an example of hindsight reasoning, supported only by the present application. To the contrary, Applicants submit that modifying Noro to include a completely different detecting means would not have been obvious and there is no apparent suggestion or motivation to do so.

Even if the Examiner is correct that the claimed amplitude detecting means was well known in the art, there still must be a convincing line of reasoning as to why one of ordinary skill in the art would have modified Noro to include such a detecting means. The Examiner simply cites alleged benefits of detecting amplitude vibrations of a loudspeaker without presenting a line of reasoning explaining why Noro would have been modified to include the claimed amplitude detecting means. Since this reasoning is lacking in the Office Action, the rejection of claim 1 is deficient. Thus, claim 1 and its dependent claims 2-4 are allowable over the prior art.

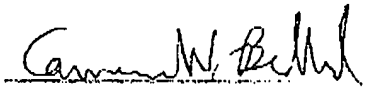
Furthermore, claims 8, 11, and 15 are allowable for reasons analogous to those for claim 1, since Noro admittedly fails to disclose all of the limitations of these claims and the Examiner has failed to provide a convincing line of reasoning why one of ordinary skill in the art would have modified Noro. See Office Action, page 4. Thus, Applicants submit that claims 8-17 are allowable over the prior art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

RESPONSE UNDER 37 C.F.R. § 1.111
U.S. Application No. 09/732,705

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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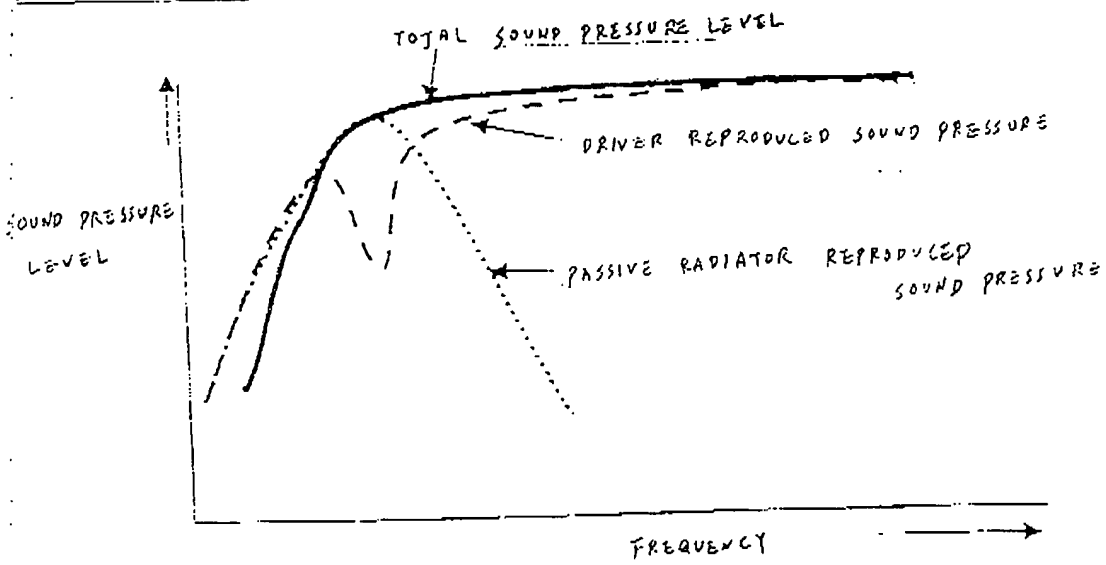
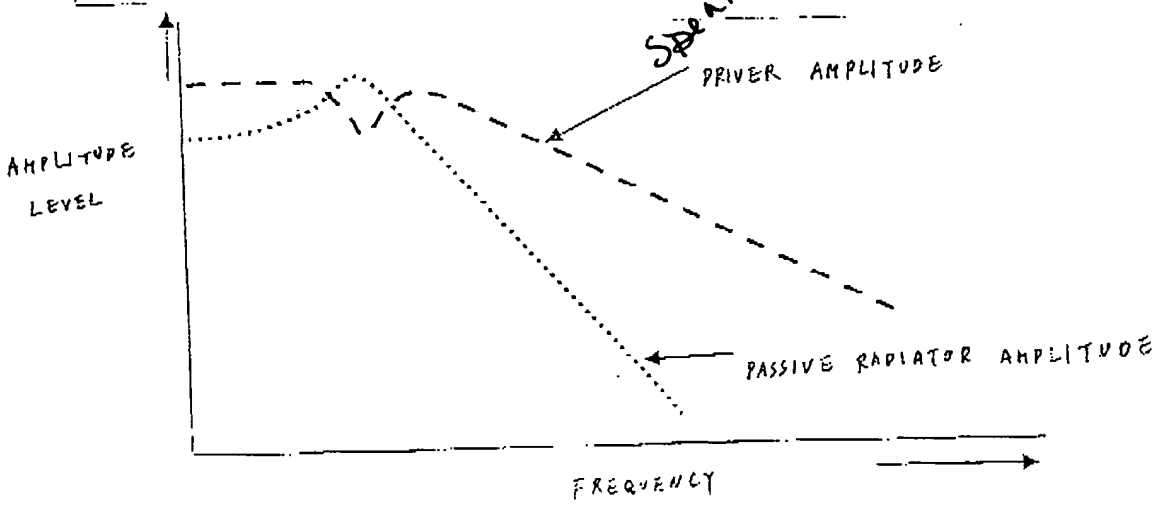
Appendix 2

APPENDIX 2

2-A REPRODUCED SOUND PRESSURE OF DRIVER AND PASSIVE RADIATOR



2-B AMPLITUDE OF DRIVER AND PASSIVE RADIATOR



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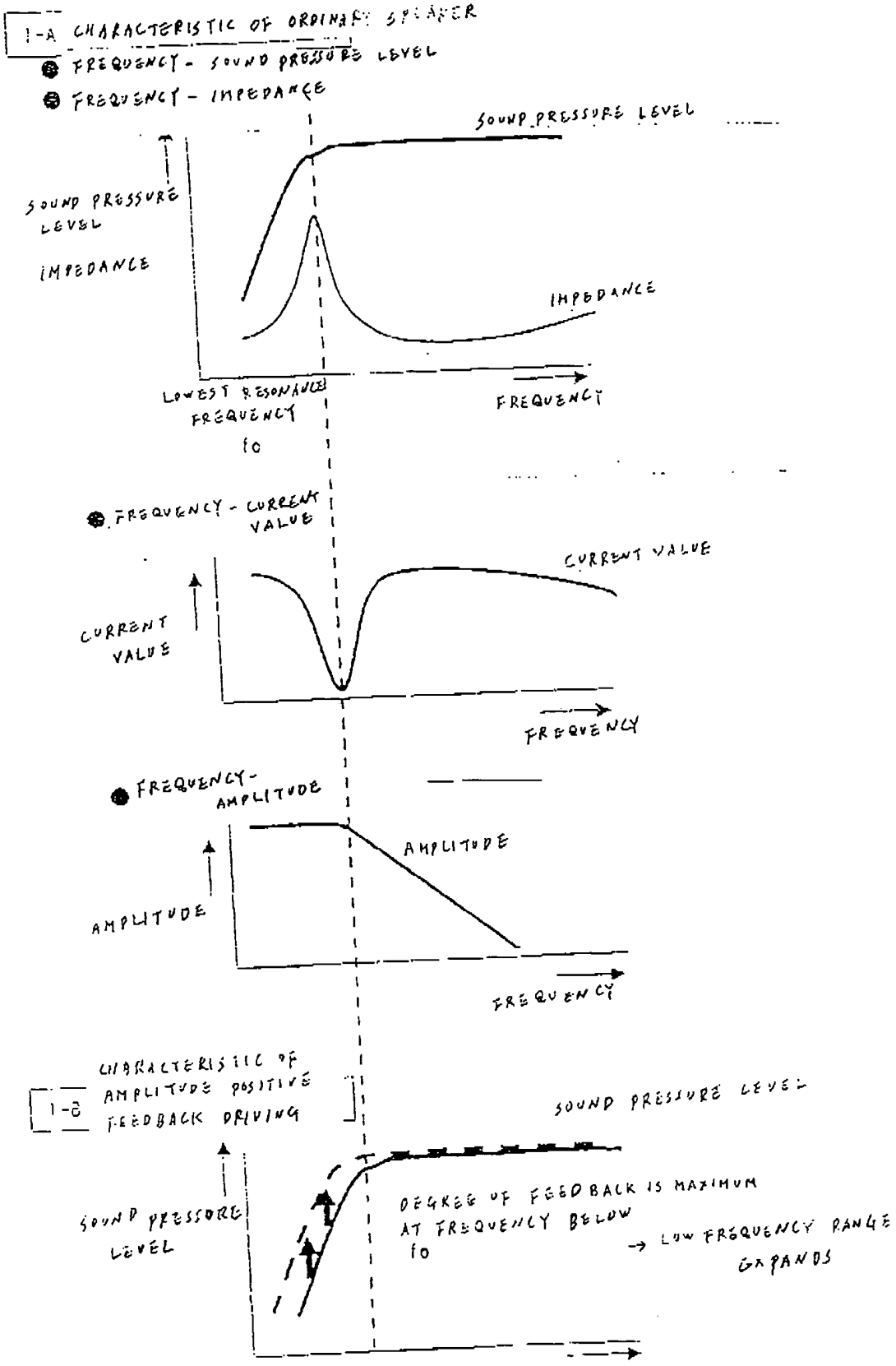
Appendix 1

APPENDIX 1



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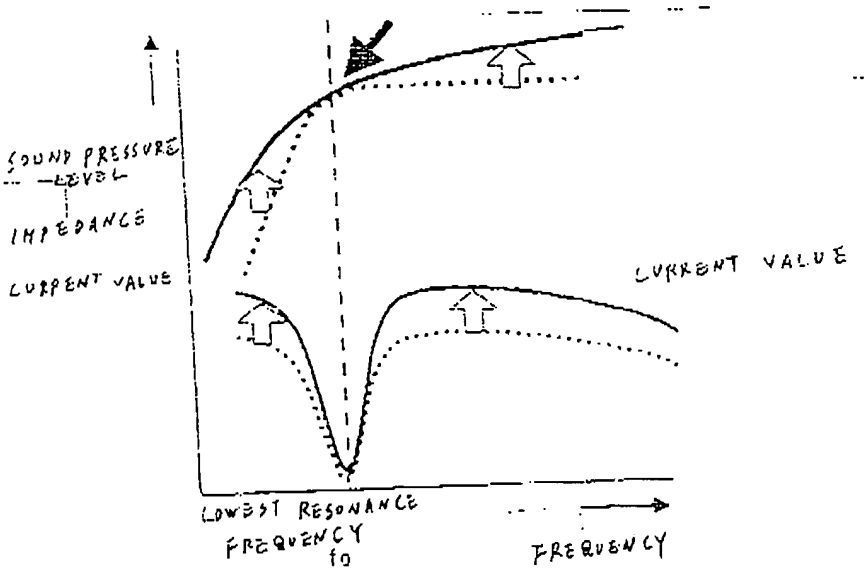
APPENDIX 3

CURRENT POSITIVE FEEDBACK OPERATION (NEGATIVE IMPEDANCE DRIVING)

WHEN CURRENT FLOWS, THE CURRENT FURTHER FLOWS OWING TO POSITIVE FEEDBACK

→ DEGREE OF FEEDBACK IS MINIMUM AT f_0



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Additional Appendix

APPENDIX : EQUIVALENT CIRCUIT OF PASSIVE RADIATOR AND ITS OPERATION

VOLTAGE F : DRIVING FORCE

CURRENT I : VIBLATING SPEED

R_{drive} : EQUIVALENT MECHANICAL RESISTANCE OF DRIVER VIBRATING SYSTEM

L_{drive} : EQUIVALENT MASS OF DRIVER VIBRATING SYSTEM

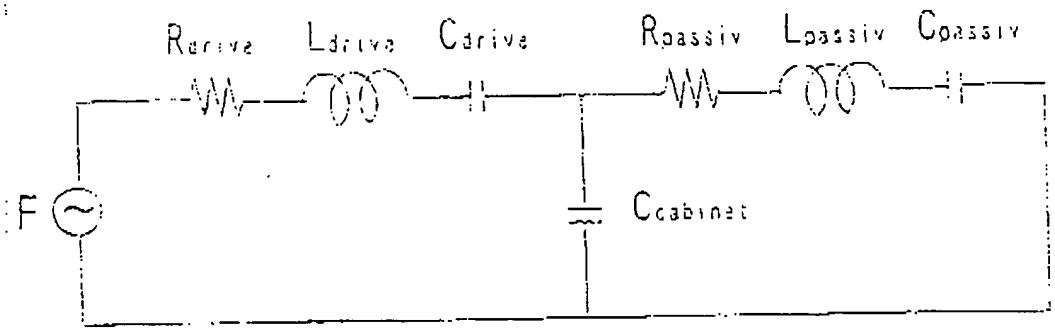
C_{drive} : EQUIVALENT COMPLIANCE OF DRIVER VIBRATING SYSTEM

R_{passiv} : EQUIVALENT MECHANICAL RESISTANCE OF PASSIVE RADIATOR VIBRATING SYSTEM

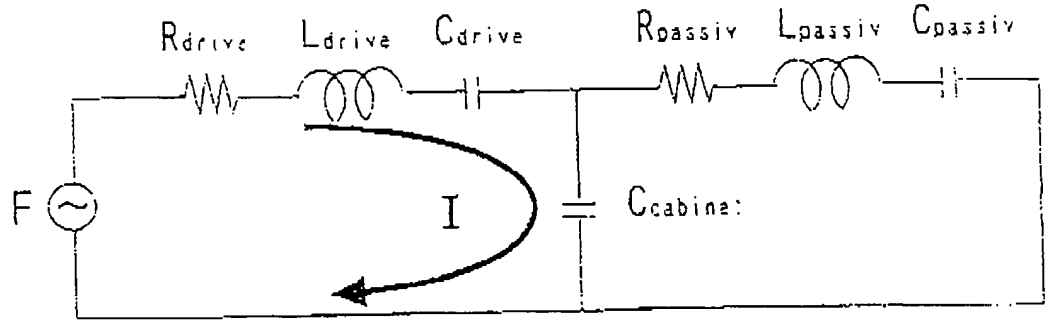
L_{passiv} : EQUIVALENT MASS OF PASSIVE RADIATOR VIBRATING SYSTEM

C_{passiv} : EQUIVALENT COMPLIANCE OF PASSIVE RADIATOR VIBRATING SYSTEM

$C_{cabinet}$: EQUIVALENT COMPLIANCE OF CABINET



① FREQUENCY HIGER THAN RESONANCE FREQUENCY:
ONLY DRIVER VIBRATES, BUT PASSIVE RADIATOR DOES NOT VIBRATE



③ RESONANCE FREQUENCY: CABINET COMPLIANCE AND PASSIVE RADIATOR PRODUCE PARALLEL RESONANCE AND AMPLITUDE OF PASSIVE RADIATOR BECOMES MAXIMUM. OWING TO PARALLEL RESONANCE, IMPEDANCE BETWEEN (A) AND (B) IN EQUIVALENT CIRCUIT INCREASES AND DRIVER AMPLITUDE DECREASES.